

CLAIMS

1. An ion source including a cathode, an anode, an ionisation region between said cathode and said anode, means for introducing an ionisable gas into said ionisation region, means for creating a potential difference between said cathode and said anode to produce a flow of electrons from said cathode toward said anode, said electron flow passing substantially through said ionisation region and causing ionisation of said gas, means for concentrating said electron flow to create a region within said ionisation region where the electron flux is a maximum, and means acting to expel ions created in said ionisation region from said ion source, wherein said ionisable gas is introduced into said ionisation region at a localised area in proximity to said region of maximum electron flux.
2. An ion source according to claim 1 wherein said ion expelling means includes means for creating a magnetic field, said magnetic field acting to influence the direction in which said ions are expelled from said ion source.
3. An ion source according to claim 1 further including means for creating a magnetic field, said magnetic field having a longitudinal axis substantially parallel with an axis of an electric field created by said potential difference between said cathode and said anode, and wherein said maximum electron flux substantially coincides with a maximum of the magnetic field intensity such that said magnetic field forms at least part of said means for concentrating said electron flow.
4. An ion source according to claim 3 wherein said anode is annular having an axis in substantial alignment with said magnetic field axis.
5. An ion source according to claim 4 wherein said gas introducing means includes a gas flow path terminating at an outlet member, said outlet member being disposed on or near said anode axis and substantially adjacent said ionisation region.

6. An ion source according to claim 5 wherein said outlet member is electrically conductive and is maintained at substantially the same potential as the anode.
7. An ion source according to claim 6 wherein said outlet member is integral with said anode.
8. An ion source according to claim 5 wherein said anode includes an internal fluid channel in communication with a fluid conduit supplying fluid to cool said anode.
9. An ion source according to claim 8 wherein said fluid channel extends into said outlet member.
10. An ion source according to claim 5 wherein said anode is mounted on a base of electrically insulating material, said base including a channel forming a part of said gas flow path.
11. An ion source according to claim 4 wherein said anode, said cathode and said ionisation region are substantially surrounded by an electrically conductive shield maintained substantially at earth potential.
12. An ion source according to claim 4 wherein said anode includes at least one surface exposed to said ionisation region, at least a portion of said at least one surface being of an electrically conductive non-oxidising material.
13. An ion source according to claim 12 wherein said electrically conductive non-oxidising material is Titanium Nitride.
14. An ion source including a cathode, an anode, an ionisation region between said cathode and said anode, means for introducing an ionisable gas into said ionisation region, means for creating a potential difference between said cathode and said anode to produce a flow of electrons from said cathode toward said anode, said electron flow

- passing substantially through said ionisation region and causing ionisation of said gas, and means acting to expel ions created in said ionisation region from said ion source, wherein said anode has at least one surface exposed to said ionisation region, at least a portion of said at least one exposed surface being of an electrically conductive non-oxidising material.
- 5 *magnet or magnetic field?*

15. An ion source according to claim 14 wherein said at least one exposed surface is a layer of Titanium Nitride coated onto said anode.
- 10 16. An ion source according to claim 14 wherein said anode is annular and includes an inner surface sloping outwards in the direction of said cathode, said inner surface being exposed to said ionisation region and at least a portion of said inner surface being of electrically conductive non-oxidising material.
- 15 17. An ion source according to claim 16 wherein substantially the entire inner surface of said anode is of an electrically conductive non-oxidising material.
18. An ion source according to claim 16 wherein said gas introducing means includes an outlet member disposed substantially at the centre of said anode, said
- 20 outlet member having a surface of electrically conductive non-oxidising material.

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